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Nat. Hist. Survey

R E P O R T

OF THE

FOURTH ROCKY MOUNTAIN CONFERENCE

OF ENTOMOLOGISTS

PINGREE PARK, COLORADO

AUGUST 16 TO 21,1926

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A Brief Report of the Fourth Rocky Mountain Conference of Entomologists, Pingree Park, Colo.
August 16 to 21, inclusive, 1926

The visitors from the various states began to arrive in Fort Collins on the 14th and 15th, some of them going on to Pingree Park, but the majority left early Monday morning, the last cars getting started shortly after 8 o'clock. As it was late in the afternoon when all arrived at the Park, it was decided to take that afternoon for the preparation of the camp and to hold the first meeting in the evening. The evening meeting was called at 7:30 by Dr. C. P. Gillette, Chairman. A rollcall was made by states, each state giving the name of the representatives present and the members of the family that were visiting. Those responding to the rollcall were as follows:

Claude Wakeland	Parma, Idaho
W. P. Hayes and family	Urbana, Ill.
E. R. Becker	Ames, Iowa
B. B. Fulton	Ames, Iowa
J. W. McColloch and family	Manhattan, Kansas
Roger C. Smith	Manhattan, Kansas
R. H. Beamer and wife	Lawrence, Kansas
Warwick Benedict and wife	Lawrence, Kansas
F. C. Hottes	St. Paul, Minnesota
R. W. Dawson	St. Paul, Minnesota
F. T. Cowan	Billings, Montana
Eugene F. Powell	Lincoln, Nebraska
Otis Wade	Lincoln, Nebraska
H. J. Grady, Calif.Chem.Co.	New York City
G. A. Bieberdorf	Stillwater, Okla.
Fred W. Bieberdorf	Stillwater, Okla.
M. D. Farrar and wife	Brookings, S.D.
S. J. Snow	Salt Lake City, Utah
C. L. Corkins and family	Laramie, Wyoming
E. J. Udine	Laramie, Wyoming
J. M. Osborn	Wheatland, Wyoming
C. P. Gillette and family	Fort Collins, Colo.
C. R. Jones and wife	Fort Collins, Colo.
George M. List and wife	Fort Collins, Colo.
J. L. Hoerner and wife	Fort Collins, Colo.
R. G. Richmond and wife	Fort Collins, Colo.
Miriam A. Palmer	Fort Collins, Colo.
Geo. S. Langford	Fort Collins, Colo.
Sam C. McCampbell	Fort Collins, Colo.
J. H. Newton and wife	Paonia, Colorado
A.C.Maxson, Great Western Sugar Co.	Longmont, Colo.

Besides the above entomologists, there were in attendance the following:

E. G. Grill .... Boulder, Colo.
Eva Doonan .... Denver, Colo.
B.O.Longyear and family, Dept. of Forestry, C.A.C.
Fort Collins, Colo.
L.W.Durrell and C.D. Learn, Dept. of Botany, C.A.C.
Fort Collins, Colo.
Leonard Johnson .... Ft.Collins,Colo.
Eunice Dalzell .... Buffalo, Wyo.

The total registration for the week was 62.

The secretary gave a brief report of the 1925 meeting, reading the program that was given, resolutions passed, and a few other important items. Dr. Gillette then gave a brief review of the purposes of the Conference, and some of the benefits that have been derived from the past meetings, and wished all a very pleasant week. Regret was expressed that Dr. C. J. Drake, vice chairman, was unable to attend the meetings this year. This is the first meeting he has missed since the beginning of these meetings.

A motion was made and passed that a program committee be appointed with the authority to arrange all of the meetings of the week, such meetings to be held at a time of day to be selected for each day. It was the wish of those present that some time be provided for recreational purposes, so it was tentatively agreed that there be about two meetings a day with one day planned so that the entire time could be taken for longer trips such as to the glacier, snow line, etc. The program committee as appointed by the chairman consisted of R. H. Beamer, chairman, W. P. Hayes and George M. List. An entertainment committee was appointed consisting of Esther Gillette, chairman, Claude Wakeland, C. L. Corkins, and Mrs. J. H. Newton. The chairman appointed the following resolutions committee: Roger C. Smith, chairman, S. J. Snow, J. H. Newton and Eugene F. Powell.

Professor B. O. Longyear gave a very interesting talk on Pingree Park, its early history, the surrounding mountains and streams, and the flora of the section. This was well received by all in attendance and many questions were asked. Following this, the meeting adjourned for a social time around the fireplace. The remainder of the evening was spent in songs and a general good time.

The forenoon of Tuesday, August 17, was spent in collecting and pleasure trips. The first regular meeting was called at 1:30 p.m., with Dr. C. P. Gillette presiding. The following brief notes were taken on the subjects discussed:

The Place of Insect Control in the Wheat Improvement Campaign in Kansas, by J. W. McColloch: Kansas has produced as high as 180 million bushels of wheat in a single year, the highest of any state in the Union. Yet the acre yield is next to the lowest, being only 12.5 bushels. A campaign is now under way to increase the yield and to decrease the wheat acreage. This is largely an extension program that is being entered into by the market division, the agronomy, plant disease and entomology departments. There has been a yield decrease in Kansas during the last 25 years of 8.5 percent. This is in spite of better cultural methods and better varieties. The insect loss has been estimated at nine million bushels per year, but during late years it has been much heavier than this. During 1925, estimates made by farmers indicated that the loss from Hessian fly amounted to 40 million bushels. This is the greatest entomological problem in Kansas, the Hessian fly occurring in all of the counties except four or five in the southwestern part of the state and it is rapidly spreading into these.

The chinch bug is a problem in many sections. This is quite well handled by a thoro burning of all hibernating places. The false wireworm and army cutworm are occasionally serious. The entomologists are attempting to harmonize their Hessian fly control with the work of the other departments. Three main points are being emphasized: (1) Early preparation of seedbed. (2) The destruction of all volunteer wheat. (3) The determination of a safe date to plant. In cooperation with the county agricultural agents, each county has a demonstration field in which wheat is planted before and after what is considered a safe date. An educational campaign is being carried on in all of the counties. A wheat train has been covering the wheat growing sections during the past three weeks. It was estimated that 158,000 people have been reached by this method. There has been no material injury from the green bug since 1916. The last serious damage from grasshoppers was in 1920. There is a white grub that is doing serious damage to wheat in some sections whenever this crop is sown on sod land.

The Hibernation of Rodents, by Otis Wade: Mr. Wade gave a very interesting discussion on the hibernation of various rodents. The hibernation of rodents is very difficult to explain, and there is need of a great deal more work on it. The hibernating habits vary greatly even within a genus or sometimes within a species. Rasmussen, of Minnesota, has been working on certain glands and has designated these as hibernating glands. Mr. Wade also spoke of some interesting work being done by Dr. Johnson of Kansas. The common belief is that external conditions are responsible for hibernation, but this has not been definitely proven. Shaw, of Washington, says that the lack of green food forces the Columbian ground squirrel into hibernation. Mr. Wade told of his experiments in which he was endeavoring to force different species into hibernation by fattening the individuals and by the use of dry grains only. His experiments seem to indicate that early fattening of the animals forces them into aestivation. It is possible to force certain species into hibernation by placing them under low temperatures.

A New Japanese beetle in New Jersey and New York, by R. W. Dawson: A new Japanese beetle which has been determined by Mr. Dawson as Autoserica japonica Motsch., has apparently only recently been introduced into this country. Records taken by different individuals indicate that it was first taken in 1920. The insect shows possibilities of being a serious pest. The larvae feed upon roots and the adults upon flowers and leaves. The adults are very general feeders.

The Spinning Habits of Samia gloveri, by R. W. Dawson: Mr. Dawson gave a very interesting account of how these larvae spin their cocoons. They first tie a number of leaves together and then lay a number of parallel threads producing several stout silky strands. The larvae move and spin across these parallel threads a series of finer threads placing them with a figure 8 motion of their heads. The cocoon is finally finished by spinning over the surface a layer of dark brown threads that give the dark color to the cocoon. This dark color enables the larva to so disguise the cocoon that it is very difficult to locate.

The second meeting on the 17th was called at 7:15 p.m., with Roger C. Smith presiding. The Spray Residue Problem by Dr. C. P. Gillette: Dr. Gillette gave a brief history of the developments leading up to the present concern that exists over the residue of spray upon apples and pears. Some concern was shown over this problem in 1922-23. At this time some shipments of fruit were held up in some of the eastern markets. During the past fall England became much alarmed over the presence of spray upon American apples and pears. They have taken the position that fruit showing more than 1/100 of a grain of arsenic per pound of apples will be excluded. It is going to be very difficult to meet these requirements, especially for some parts of the western slope in Colorado, where spraying is very heavy. A series of meetings have recently been held in the fruit-growing sections in which the problem was discussed before the growers by Dr. Elliott of the Bureau of Chemistry, U.S.D.A., Dr. Bennett of the State Board of Health, and Dr. C. P. Gillette. The growers are much disturbed over the prospects and a number of samples of fruit that have been analyzed show that even with careful wiping it is going to be difficult to bring them to the standard. Fruit from Delta County that had been sprayed with arsenate of lead, one pound to 50 gallons, showed .06 of a grain of arsenic to the pound. Others that had been sprayed with arsenate of lead, two pounds to the 50 gallons, showed .12 grains per pound. These orchards have been sprayed five times. Mr. Newton stated that in Delta County the number of applications might be reduced from five to three, providing other methods of control such as bands are used. Mr. Wakeland stated that some of the Idaho growers had trouble this past year with fruit that had been placed in storage. Other large growers had an entire crop turned down. The Idaho growers are installing wiping machines and some are using oil to supplement the arsenate of lead, but this is considered to be in the experimental stage. Mr. J. H. Grady, stated that oil emulsion showed considerable promise as an ovicide. So far, there has been no burning from the Volck oil as it is used in various experiments. Mr. Wakeland stated that in the state of Washington apples would not be accepted by the state department where they had been sprayed after July 1.

Recent Work on Insect Carriage of Disease, by E. R. Becker: Kala azar is about the last important protozoan disease which is not fully understood. This disease has been bad in Assam, India; as early as 1902 the organism was found by Rogers. At this time the patients were isolated which seemed to prevent spread of the disease. The bedbug was thought to be the carrier. A recent work by the English Commission and American Commission working on this disease has added considerable information. The American Commission found a susceptible animal in the hamster, a rodent animal of that country. The English Commission found that the Phlebotomus sand fly became infected from the hamster. The establishing of infection from the hamster has not yet been worked out.

A New Cherry Pest: George M. List. Northern Colorado has rapidly been becoming an important sour cherry growing section. The fruit has often sold at a premium because of its freedom from worms. In 1915 the speaker bred two beetles which were determined as *Tachypterellus quadrigibbus* from cherries growing in the foothill section west of Fort Collins. This same insect has been observed in the same locality practically each year since then. In 1921, material bred from the cherries was again determined as *quadrigibbus*. During that year as high as 20 percent of the fruit on some trees that were growing near some chokecherries was infested. This past season there was a serious outbreak in a cherry orchard five miles south of Fort Collins. In this orchard of about 8 acres the fruit was practically 100 percent damaged by food and egg punctures, 100 cherries taken at random showing a total of 404 punctures. Two hundred cherries showed an actual infestation of 51½ percent. Food punctures were quite numerous in the apples growing in a near-by orchard. A few eggs were found in the apples, but no larvae were ever taken developing in these fruits. There is some doubt as to this being the true apple curculio as found in some eastern sections. The adults are somewhat smaller and differ considerably in certain habits. The insect shows possibilities of being a very serious pest to cherries.

Wednesday, August 18: Meeting called to order at 8:30 a.m., R. W. Dawson, presiding.

The Shipping of Bees and Honey, by R. G. Richmond: Mr. Richmond discussed the problems that have developed during the past few years in connection with the shipment of bees and equipment, and honey. At the present time there are five or six states that have quarantines relating to the shipping of bees on combs and the shipping of bee equipment. North Dakota has very rigid requirements in this connection. It is considered that some regulations on the shipment of equipment are very necessary, but it is felt that where a state has a quarantine inspection system that its certificate should be accepted by other states. It is possible and probably more practical to ship the bees in packages and thus avoid the difficulties of meeting the requirements on equipment. At the present time there are several states advocating the certification of honey. They are making requirements that are almost impossible to meet by most of the honey-shipping states. It will practically mean an embargo on honey. It is almost impossible to certify to car lots of honey as coming from apiaries that are entirely free from disease. This past year Colorado was able to certify to only two carloads of honey, and about the same situation existed in Wyoming.

There was a general discussion in regard to the need of more uniform inspection systems in the western states. It was the consensus of opinion that some steps should be taken to make inspection more uniform. Mr. Corkins stated that Wyoming would not accept certificates on used equipment unless this equipment came from territory that could be certified to as being disease free territory.

Beekeeping Possibilities in South Dakota, by M. D. Farrar: Beekeeping in South Dakota is very much undeveloped. It is believed that the state has great possibilities in this connection. At the present time the state does not have adequate laws to protect the industry. There are practically no regulations on the shipping of either bees or equipment. Beekeeping is on a rapid increase and there is an urgent demand for some protection. The beekeepers realize that it would be more practical to keep the state free from disease than to clean it up after it once is badly infected. Sweet clover is the most important honey plant. It occurs very generally and grows very luxuriantly over practically all of the state. The acreage increase of this plant this last year was 17 percent, which is far in excess of the rate of increase of bees. It is being used as a crop in the small grain rotation. Mr. Farrar told of experiments he has under way to determine the importance of the bee in the pollination of sweet clover. Where all large bees, including the honey bee as well as wild species, are excluded from cages, there has been only about 6 percent pollination. It is difficult to keep the small bees from the cages, but indications are that very little sweet clover is produced where bees do not have a part in the pollination.

Apicultural Work in Wyoming, by C. L. Corkins: There has been a very rapid growth in research work in apiculture all over the country. Practically all states have some work under way in this field at present. Wyoming has three main projects: (1) Selective breeding: Wyoming has many isolated places where bees can be kept without any possibility of them breeding with those from neighboring apiaries. This has encouraged the taking up of some problems in breeding. The work has been under way two seasons. Three races of bees are being carried: Italian, Carniolan and Caucasian. It is hoped to develop more desirable strains of all these races. In some of the work in breeding tests are being started. It is not known just how long this can be continued. (2) Wintering: It is absolutely necessary that all bees in Wyoming be protected during the winter. At the present time all of the work is confined to outdoor tests. It has been found that cellar wintering favors the spread of disease, so at the present time this method is being discouraged. (3) Foul Brood Control: Wyoming, like many other states has a high percentage of disease. Two years ago this was more than 11 percent. Now it is less than 5 percent. There are only two or three counties that are free from the disease. Practically all of the bees are in the hands of commercial beekeepers, so the problem is more simple in many other states. In the disease control work it has been found that the Hutzelman solution is so expensive that its use leads to poor work and is not being strongly recommended at the present time. Work is under way on the soap formaldehyde solution. The California formula of soap formaldehyde is not considered safe to use as there is a 12 to 14 percent loss in wax content which is disastrous. The Wyoming method is to immerse the combs in water first then immerse in soap formaldehyde solution or only in water and formalin.

It is believed that there is a possibility of developing immunity to foul brood by selective breeding. Mr. Corkins cited the experience of Mr. Rauchfuss in keeping certain apiaries free from disease. In these he has used Caucasian bees which seemed to be resistant to the disease or had the ability to clean it up. In a number of cases diseased colonies have entirely eliminated the disease. There is little robbing among these which probably is a big factor.

Insect Habits and Geography, by B. B. Fulton: Mr. Fulton talked on the great variation that often occurs within a single species when they exist under different environments. He cited the example of the snowy tree cricket, speaking of its different egg laying habits under different conditions. The corn borer in different sections of the east is single and double brooded. He cited the example of the variations occurring in Tachypterellus quadrigibbus as cited by List as occurring on cherries in Colorado. The song habits of various insects vary a great deal. This is especially true of the crickets. The common ground cricket has three distinct song habits in the state of Iowa: Mr. Fulton imitated the songs of a number of crickets as they vary under different conditions. It is possible, as Mr. Fulton, stated, that these variations may be indications of a new species in the making.

Dr. Gillette asked the following to act on committees in addition to the numbers that were appointed on these committees a year ago:

Committee on Organization: Farrar, Becker and Dawson

Committee on Publication: Hayes, McColloch and Corkins

Wednesday evening, August 18, 7:30. J. W. McColloch, presiding.

C. R. Jones brought up the matter of expense and gave estimates of the various expenses incurred in providing meals and accomodations. It was stated that about the only way this could be handled would be to prorate it on the meal basis. At the time, it appeared that the expense would be about 46¢ per meal. It was moved and passed that a charge of 50¢ per meal be made and if any more funds were needed to cover all expenses a statement would be sent to those in attendance. It was thought that this would give funds enough to settle all accounts and provide a small fund for postage in sending out announcements of next year's meetings.

The plans for Thursday were discussed. It was decided that since several desired to take the entire day off for the trip to Hallet's Glacier, it would be best not to have any meetings during the day and to have only an evening meeting.

It was also decided that noon lunch would be prepared for everybody in a form that they could take it on their hikes and collecting trips and that no noon meal would be served.

Alfalfa Insects, by R. C. Smith: A bulletin is soon to be issued from the Kansas Experiment Station dealing with the insects of alfalfa in that state. Over 300 species of insects have been taken on alfalfa. Only a few of these are serious pests but many of them are potential enemies of this important crop. A summary of over 700 replies received from farmers of the state indicates that insects are second only to weather in the factors limiting alfalfa production. There was a serious outbreak of pea aphis on alfalfa in several sections of the state this last spring. In various control tests that were made calcium cyanide gave the best results. It is most too expensive to use when it is necessary to treat a large acreage, but since the insect winters over largely in protected places, it is a practical means of preventing the spread of these centers of insects. Under these conditions 30 to 35 pounds of the granular form per acre gave good results.

The aphidozer which is used in the control of the pea aphis on peas in Wisconsin gave good results on one ranch where it was used. In the outbreak of the alfalfa cutworm good results have been secured in the use of poisoned bran mash. The clover root curculio is of considerable importance in certain sections. Mr. Smith also spoke of a number of other interesting entomological problems that have come up. During the past year he has reared a Mantispid which, as far as he knows, is the first one ever reared in this country. One female deposited over 2000 eggs. Mention was made of some interesting studies being made on the temperature of insects. These are being made by instruments that make the record to 1/1000 of a degree. It was found that the alfalfa leaf had a temperature a little lower than air, and, contrary to common belief, the temperature of insects was found to be slightly lower than that of air. The sun is not as important a factor in killing insects on the ground as is often thought. It was found that where they could crawl upon some debris or stubble even 1/8 or 1/4 inch above the surface that they would be protected even where high surface temperatures existed. Mr. Smith also spoke of his disappointment in the use of calcium cyanide for house fumigation during the winter. Due probably to the lack of humidity two pounds to the 1000 cubic feet did not give satisfactory results. Some work is being done with the cyanide that is made in California, known as Calcyanide. This was giving excellent results as a fumigant. The gas is given off 20 times more rapidly than with the ordinary calcium cyanide and for that reason it is quite dangerous to use. The gas which is given off is probably HNC instead of HCN, as is derived from most cyanide compounds. The Calcyanide is showing some very promising results for the killing of flies in stables. A light dusting of the material after the stock has been turned out gives practically 100 percent fly kill. The gas is generated with a much lower humidity than is required for other products. The gas has not proven injurious to vegetation where it has been tested. One pound of the material to 2000 or 2500 cubic feet gave excellent kills.

The Alfalfa Weevil, by S. J. Snow: Mr. Snow showed a motion picture of the alfalfa weevil which had been prepared by the U. S. Bureau of Entomology. This was a very interesting film showing the development and the injuries of this insect as well as the different methods of control. Mr. Snow stated that spraying for the control of this pest, exclusive of labor, was costing from 50 to 75¢ per acre. Dusting, which in many cases is more practical, is showing good results under some conditions, but as yet is considered to be in the experimental stage. Airplane dusting has been tried by Mr. Reeves but as yet the data on this work is incomplete.

Alfalfa Weevil Conditions in Colorado, by J. H. Newton: Mr. Newton gave an account of the finding of the weevil in Delta County, Colorado, in 1917 and a spread of the insect since that time. During the first three years there was a spread of about 30 miles. Since that time it has not been so rapid until this past season. During the past season the insect has been found in four additional counties: Ouray, Routt, Moffat and Rio Blanco. The spread into Ouray has been only a very slight one across the boundary from Montrose County; that into the last three named counties in the northwestern part of the state is thought to be either from the west in Utah or from the north in Wyoming. It has been known to occur in these two sections for a number of years. Until this year the injury during the past four or five years has not been great, but this year a number of fields have been injured as much as 30 percent.

Alfalfa Weevil in Wyoming, by E. J. Udine: The alfalfa weevil was first found in southwestern Wyoming in 1914. There has been a constant spread until the present time when it occurs in the western part of counties bordering in Nebraska. In many sections the injury has not been serious during recent years. It was the heaviest this year in the vicinity of Casper. Last season the infestation was thought to be heavy enough to demand careful control work this year, but for some reason the increase this year was not as great as anticipated and little injury resulted. It was thought that the cold weather was the limiting factor.

Thursday, August 19, 7:45 p.m. B. O. Longyear, presiding. Dr. Gillette suggested that since it seemed to be the consensus of opinion that the meetings of the Rocky Mountain Conference of Entomologists be made an annual affair a nominating committee should be appointed. It was moved and passed that Dr. Gillette appoint such a committee. This committee consisted of Claude Wakeland, R. W. Dawson and J. W. McColloch.

Volck Oil, by H. J. Grady. Mr. Grady gave a general description of the early history of this miscible oil and mentioned its use in the citrus belt of California over a period of several years. He stated that its freedom from burning depended on the oils that were emulsified being so treated that all unsaturated hydrocarbons were removed. He stated that in a number of sections experiments are under way to determine its value in controlling the codling moth. It has been used successfully in greenhouses for the control of aphids, white fly, mealy bug, red spider, and various scale insects. The oil is not only effective against the eggs of the codling moth but also kills any larvae it may strike. In some cases it has been found to penetrate a considerable distance into the fruit thru the entrance holes and thus kills larvae. Eggs deposited on leaves as much as 8 days after the oil has been applied are killed. The length of time wherein protection of this nature is secured depends to some extent on temperature and other factors which have a bearing upon the volatilization of the oil. Leaf hoppers, both young and adults, are destroyed when sprayed with this material and it also has ovicidal value against the same insect. It has been found to give good results as an ovicide against leaf miners. It is thought that it has considerable repelling effect against the codling moth. They avoid laying eggs on trees that have been sprayed with it. It has replaced sulphur dusts on the Pacific Slope for the red spider and is being used extensively in many cities by city foresters for the control of scale insects. It has never been found injurious to vegetation and is not disagreeable to the operator applying it, in fact the oil may be eaten without injury. The oil used in making the emulsion is of a similar type to that of Squibbs Petroleum, or other such oils. It has been found to be compatible with all other insecticides and fungicides except sulphur, and is often used as a spreader.

The Snowy Tree Cricket, by Claude Wakeland: For many years the snowy tree cricket was considered to be a beneficial insect, but in the Boise-Payette Valley, Idaho, it is proving a very serious pest to prunes. The injury is caused on the twigs by egg punctures and on the leaves and fruit by food punctures. Decay and molds often follow the punctures on the fruit, thus greatly increasing the amount of injury. During 1923 injuries occurred in practically all fruit districts in Idaho. In some sections it ran as high as 35 percent. Injuries are also found on chokecherries and other wild fruits. Mr. Wakeland showed a series of lantern slides that illustrated very nicely the life history and the type of injury caused by this insect. Severe injury occurred on prune leaves this year about July 15. Adults were numerous July 25. Injury occurs at 3 periods in the life history of the insect, egg laying, nymphs and adults. The nymphs and adults have the habit of feeding during the evening and morning. They will return many times to the same puncture. In a few cases the injury has been as high as 65 percent of the fruit. The population per tree has been found to vary from 50 to 800 crickets. The injury they classed as indirect is the greatest. The indirect loss was divided as follows: (1) Assorting loss. (2) Reduction in price received. (3) Shipments being refused on distant markets.

Calcium arsenate dust has been found to be quite effective. As high as 100 percent kill as been secured in 7 days. Some protection is secured from lead arsenate spraying. During 1924 the outbreak was especially heavy. The control recommended, however, gave good results. In this work about .25 of a pound of calcium arsenate was used per tree with the full bearing trees. The cost of control was something like $2.50 per 100 trees for materials only.

Following this discussion a motion picture film, produced by the U. S. Forest Service, entitled "The Old Santa Fe Trail", was shown. Following this were songs and impromptu stunts.

Friday, August 20, 2:30 p.m. Claude Wakeland, presiding. Mechanical Flea Beetle Catchers, by J. L. Hoerner. Mr. Hoerner spoke of the damage being done by the potato flea beetle, Epitrix cucumeris, in the Greeley potato growing section of Colorado, and of various experiments for its control. This insect is very general, infesting probably all states of the Union. The beetles have been found to avoid foliage that has been sprayed with bordeaux or the arsenical sprays, but this apparently is of little value in protecting potatoes as the greatest injury to potatoes comes from the work of the larvae on the tubers. The spraying will reduce the leaf injury but has not materially reduced the injury to the tubers. Calcium cyanide dust used in a 30 foot canopy gave as high as 75 percent control on potatoes. This requires about 30 pounds to the acre but the labor necessary is considerable. From one plant which was carefully treated, 100 dead beetles were taken, but 25 live ones remained. Metcalf had considerable success in catching adults in a trap lined with Tanglefoot. As many as 15,000 to 16,000 beetles were collected per acre. With this method it was necessary to reline the mechanical catcher about every hour with tanglefoot. Instead of the tanglefoot Mr. Hoerner has been using calcium cyanide in the bottom of the trap, which seems to be much more effective. The small box trap which is pulled over the vines is equipped with cross wires which agitate the plants thus causing the adults to hop from the plants and upon striking the sides of the box they fall into the cyanide below. Very few escape from the cyanide. Tests were made in the potato fields with the Burlin aphidozer, but it was found too cumbersome for the rough soil that exists under irrigated conditions. It has caught 2,500 beetles on 1/10 acre. Three hours later Mr. Hoerner went over the same 1/10 of an acre with the trap equipped with the cyanide pan and collected 3,500 beetles. This would have undoubtedly caught more if used before the Burlin aphidozer. Attempts to place the cyanide trap on wheels have been failures, but they can be so arranged that one man can carry two and thus cover two rows almost as fast as he would care to walk. It may take some two or three treatments with the trap to be very effective but in spite of that it looks to be the most practical method of control for this insect.

Insect Conditions in Oklahoma, by G. A. Bieberdorf: Mr. Bieberdorf stated in the beginning that he would not mention Oklahoma politics but would only state that Oklahoma was going thru the same stage of development that practically all of the older states had gone thru. Oklahoma insect problems are numerous. The state is so situated that it has or will have all of the problems of the North, East, South and West. The state has conditions suitable to all of these pests. The altitude ranges from 400 to over 5000 feet for the elevation. The cotton boll weevil is one of the most serious problems. It now exists over the entire state wherever cotton is grown. The boll weevil work is carried on largely thru cooperation with the county extension agents. Definite plots are selected and dusted by college workers according to the best methods. Farmers cultivate and harvest crops and keep the yields separate then accurate reports are made to the college workers. In four years work there has been about 50 percent of the time the checks have equalled the dusted plots and in many cases the yield on the checks has exceeded that on the treated plots. One explanation for this is that the dust destroys the lady beetles and thus favors the development of the cotton louse, which in turn reduces the crop probably as much as the weevil. They have come to the conclusion that calcium arsenate, molasses and arsenic, and Hills Mixture are not profitable means of control. They are recommending that the growers go back to early planting to avoid damage from the weevil. The Florida plan of picking all squares up to a certain date has failed absolutely in Oklahoma. The situation is that the growers must be able to grow a crop in spite of the weevil.

The cotton flea hopper has recently crossed the Red River and may prove a serious pest. They are recommending sulphur as used in Texas. It is thought that the lady beetles are killed on the dusted cotton by the fact that they take moisture from the leaves and in this way get enough arsenic to destroy them. Lace winged flies are not killed. Grasshoppers are often a serious problem in Oklahoma but they are controlled with the poisoned bran mash. The sweet potato weevil has been taken in the state two different times but it is thought that it has been stamped out. The codling moth is very difficult to control. The usual practices for control are considered unsatisfactory. The grasshopper work has been held back considerably by a fear that the poisoned hoppers would be eaten by poultry and even if they did not kill the poultry, the poultry in turn might be poisonous to people. It has been difficult to overcome this prejudice against poisoning hoppers.

A Photometric Method for Determining the Amount of Food Consumed and Time of Feeding of Grasshoppers, by Geo. S. Langford: It is important to know just when and how much hoppers feed and to know what degree of infestation justifies control work. There has been considerable work done in this connection at different places but the methods involved have prevented the data from being entirely convincing. As yet, the photometric method of determining the amount of feeding has been tried only in the laboratory, but there is no reason why conditions here could not be made to approximate those of the field. This method is going to make it possible for a person to handle larger numbers which seems to be almost impossible where the weight method is employed. At first it was tried to use a stamp method placing a rubber stamp over the leaf endeavoring to make an imprint of it on paper, but this was not satisfactory. Blue print paper was found to be more satisfactory. By exposing the leaf an accurate record can be made of the portion eaten. Where a considerable portion of a leaf may be eaten, as with the more mature hoppers, it is necessary to make a print of the entire leaf before it has been fed upon, but with the smaller hoppers that feed only a little, this is not necessary. With a planimeter it is possible to get an accurate record of the portion of the leaf eaten. In this work an effort is being made to determine the amount of food eaten, the effect of temperature upon the time of feeding, and the amount and time of day feeding takes place. Vandyke paper has been found to be even more satisfactory than blue print, as it can be photographed and also can be used to make blue prints from. Mr. Langford showed a number of prints illustrating the feeding during different instars and under different temperature conditions. Some of these records have been begun at 5 a.m. and running until 8 p.m. Under the higher temperatures the hoppers feed several times a day and the amount of feeding seems to be almost directly in proportion to the temperature. The hoppers were found to feed on the average 3.3 times per day, but this will vary some with the different conditions. The prints showed quite conclusively the periods during the day when the greatest feeding takes place.

The Mormon Cricket in Montana, by F. T. Cowan: There were quite serious outbreaks of the Mormon Cricket in different sections in Montana during 1925 and 1926. The damage, altho it occurred in sparsely settled sections was estimated to be more than $60,000 each year. Since control with poisoned baits has been quite well worked out on this pest, little attention has been given to further research in that direction. During 1926 the farmers were well prepared to poison. Many of them had all the necessary materials on hand but many of them became discouraged as they could not see the results expected. This was largely due to the fact that the crickets were almost constantly on the move and if one band was poisoned another might move into the same location and the numbers apparently were little reduced. Considerable work has been done the past season testing sprays and dusts. Sodium arsenite, one part to 128 parts of water gave little results in four or five days. One part to 64 parts of water gave considerably better results, but one to 32 and one to 16 gave very satisfactory kills. These strengths also burned all of the weeds and crops they were applied to, but they were used quite extensively on roadsides and such places with very good results. It has been very difficult to check accurately on the results secured, but there are many places where the crickets could be raked up by the handful under the weeds and bushes. Sodium arsenite applied as a dust gave excellent kill. In some places it was considered practically a 100 percent kill. Calcium cyanide dust also showed promise but did not appear to be as effective as the sodium arsenite dust. Plans are now under way to use barriers next year. These will be made of a 10 or 12 inch board with a four-inch tin on the top, placed at right angles. It is thought the migration can be checked in this way and diverted from valuable crops, and the crickets then poisoned by the use of sodium arsenite dust and spray. These barriers will cost about $200 a mile but are considered practical under some conditions. The sodium arsenite dust as used is now on the market and sells at about 40 to 45¢ per pound.

Business meeting: Reports from various committees were called for. The following report of the Resolutions Committee was read and accepted:

RESOLUTIONS OF THE FOURTH CONFERENCE OF ROCKY MOUNTAIN ENTOMOLOGISTS, ASSEMBLED AT PINGREE PARK AUGUST 16-21, 1926

Inasmuch as we have been privileged to enjoy another meeting of the Conference of Rocky Mountain Entomologists, be it hereby resolved:

1. That our heartiest thanks and appreciation be extended to the Colorado Agricultural College, particularly to the Department of Forestry, for the use of the ground, lodge and equipment at Pingree Park for the Conference.

2. That we extend our sincere thanks and appreciation to the staff of the Department of Entomology of the Colorado Agricultural College for their efforts in arranging this meeting and so successfully supplying our needs while in conference. Particular mention is given to Dr. Gillette for his efficient supervision of the plans for this meeting and its conduct; to Mr. List for his efficient work as secretary; to Mr. Jones for his preparation and handling of eating and sleeping comforts, to the kitchen staff and all committees who have served during this meeting.

3. That this Conference go on record as favoring an adequate bee inspection program in the states of this region, and that the members of this Conference use their influence to further cooperation between these states and for the attainment of uniformity of these regulations.

4. That this group of entomologists and naturalists go on record as being opposed to any more lenient policy of leasing forest lands by the federal government for grazing than the present one in order to preserve extensive forest areas in natural condition for the pleasure and profit of future generations and that the secretary of this Conference be instructed to inform the Secretary of Agriculture of this resolution.

5. That it is the sense of this meeting that the present regulation dealing with arsenical residue on fruit has been enacte without sufficient investigation, and since in some cases this regulation has worked an injustice and brought about a feeling of uncertainty among the growers, that we request the Department of Agriculture through its qualified agencies to make a more thorough investigation of this subject for the benefit of entomologists, horticulturists and growers to the end that they may be able to carry on effective fruit insect control without endangering the health of the public, and that the secretary of this Conference be instructed to inform the Secretary of Agriculture of this resolution.

6. That machinery be set up at once for the recording of the various insects of the Pingree Park region, including interesting observations and other aspects of the species in question looking towards the eventual publication of an annotated insect faunal list of the region.

7. That it is the belief of those attending this conference that these meetings are of such worth that we should send reprints of the published reports of these meetings to the various state and federal agencies to inform them of the nature of this Conference.

8. That these resolutions be inscribed on the minutes of this Conference and that copies be sent to the President of the Colorado Agricultural College and to the Head of the Department of Forestry of this same institution.

Signed:
Roger C. Smith
S. J. Snow
J. H. Newton
Eugene F. Powell

Resolutions Committee

It was moved and unanimously passed that the Conference give a rising vote of sympathy to Dr. C. P. Gillette and Mr. W. P. Yetter, Jr., on account of the loss of their wives during the past year.

The following report of the Committee on Organization was passed by the Conference:

Your Committee on Organization begs to present the following report:

We recommend-

1. That the organization of the Rocky Mountain Conference continue as at present, without constitution and by-laws, and governed by such rules and regulations as may be passed from time to time by those who attend the conferences.

2. That officers be elected each meeting for the ensuing year, and so long as the present plan of meeting in Pingree Park is continued, entailing the many details of arrangement, the offices of chairman, secretary and treasurer be chosen from the faculty of the Colorado Agricultural College.

Signed:
C. P. Gillette
Claude Wakeland
E. R. Becker
M. D. Farrar
R. W. Dawson

Committee

Before the acceptance of the report of the Committee on Organization, there was considerable discussion in regard to the advisability of having a constitution and by-laws. It seemed to be the consensus of opinion that they were little needed, but it was felt, however, that there should be some statement of purpose for the gathering, as there seems to be some misunderstanding among certain workers as to the aims of the meeting. The following statements of purpose were offered and passed as a supplementary report of the Committee on Organization:

That the objects of the Rocky Mountain Conference of Entomologists have been and shall continue to be:

1. For recreation and the most informal fellowship and acquaintanceship, not among ourselves alone, but including the members of our families.

2. For the presentation of papers and discussions upon entomological subjects in general, but more especially upon those subjects upon which the members of the Conference are doing original work.

3. For the promotion of a spirit of genuine cooperation among the members of the Conference in the solution of our entomological problems.

4. For the purpose of making as complete a collection and study as possible of the alpine insect fauna of the Pingree Park region

5. Which includes all the others, for the purpose of bettering our work and enabling us better to serve the interests of those for whom we labor.

The Committee on Publications made the following recommendations which were unanimously accepted by the meeting:

Your Committee on Publications begs to recommend:

1. That the action of the Conference taken last year concerning publications be reaffirmed as our policy this year.

2. That the secretary send to all entomologists, who in the past have attended any of the Rocky Mountain Conferences, a brief summary of the papers and discussions presented at each conference, and that hereafter all who present papers or discussions be asked to deposit with the secretary such summaries with the understanding that he may further condense the matter presented, if necessary, in order to bring it within the space that can be allowed for his report.

3. That the secretary be presented with three copies of separates of all papers published by members of the Conference that contain references to insects taken in the Pingree Park

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area, at least one copy of which shall be preserved in a loose-leaf binder as the property of the Conference.

4. That the secretary shall, each year, send a letter to all entomologists who have attended the Rocky Mountain Conference of Entomologists, asking for lists of all insects taken by them in the Pingree Park area, so far as they have been determined, along with the known data as to altitude, dates taken, food plants, name of collector, and by whom determined. If species have been published upon, a reference to the publication should also be given.

5. That a small assessment, sufficient to take care of the necessary expenses of the secretary in gathering the data above referred to, be added to the other expenses of the Conference each year.

Signed: C. P. Gillette
W. P. Hayes
R. H. Beamer
J. W. McColloch
C. L. Corkins

Committee on Publications.

The Committee on Nominations reported the following for officers for the 1927 meeting: Dr. C.P. Gillette, Chairman; W. P. Hayes, vice Chairman; G. M. List, Secretary; C. R. Jones, Treasurer.

The matter of the program for another year came up and was discussed. All felt that much could be gained by selecting subjects of common interest for symposiums, especially under the type of informal meetings that are being held. It was moved and passed that the officers compose a committee for the selection of a topic or topics for a symposium next year.

The secretary asked for any suggestions that any members might have as to the manner in which we could best reach entomologists in connection with future meetings. It was felt that the notices as sent out in the past had been quite satisfactory, but that it might be well to place a notice of the meeting in the Entomological News as well as in the Journal of Economic Entomology.

Mr. C. R. Jones asked for suggestions in connection with the handling of the camp and the feeding of the people. All seemed to be well satisfied with the plans of the present meeting.

This, the last formal meeting of the 1926 Conference, adjourned at 5 p.m., and all immediately began to arrange for the state stunts to be held that evening. A few of the delegates returned to Fort Collins during the forenoon of the 21st, but the majority remained until after lunch when camp was broken and all returned to Fort Collins and their homes.

George M. List
Secretary.